

BUCKHORN IRON FURNACE
Buckhorn Hollow Road
Pedro vicinity
Lawrence County
Ohio

HAER No. OH-114

HAER
OHIO
44-PEDRO.V
1-

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
Great Lakes Support Office
1709 Jackson Street
Omaha, NE 68102-2571

HISTORIC AMERICAN ENGINEERING RECORD

BUCKHORN IRON FURNACE

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Location: Buckhorn Hollow Road
Pedro Vicinity
Lawrence County, Ohio
USGS Pedro, Ohio Quadrangle
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Significance: Constructed as a charcoal iron furnace, the Buckhorn Iron Furnace is significant for its contribution to the early industry and settlement of Southern Ohio and the American frontier in the early 1800s.

Description: Buckhorn Iron Furnace is located on Buckhorn Hollow Road in Decatur Township, Lawrence County, Ohio. The only structure left of the furnace is the stone stack. The stack is partially concealed within the slope of the hill and is in a deteriorated condition. The acreage around the furnace has been both pasture and farm field and has been fenced.

The stone stack is approximately 33 feet square at the base with a circular interior 10 feet in diameter. The top of the stack is 20 feet square with a central, circular opening of 9'-0". The front elevation faces the east and has a central opening 13'-0" wide at its base, 6'-0" wide at its top, and 12'-0" high. Above the opening, a stone header is carved with the words "BUCKHORN T. PRICE BUILDER."

The elongated stones of the furnace were laid without mortar. On the upper corners there are iron loops driven into the rock. Several of the loops still contain a circular piece of iron held by a pin inserted through the loop. The circular, battered stack is intact on the interior of the furnace; it is constructed with fire brick held in place with mortar. The sand and rubble fill around the circular stack has deteriorated away.

The furnace is currently in a state of deterioration. There is a tree growing out of the top of the furnace stack, with the sloped ground eroding around the furnace. Several stones have fallen from the interior and a large stone hangs in balance, slipping from above the front opening. The property is currently owned by the USDA Forest Service and is being maintained in its present state.

History:

The Hanging Rock Iron Region consisted of the iron furnaces and furnace lands of an extended and rich vein of iron ore, limestone, and charcoal located across Southern Ohio and Northern Kentucky. The region is located in Carter, Boyd, and Greenup Counties in Kentucky, and parts of Lawrence, Scioto, Gallia, Jackson, Vinton, and Hocking Counties in Ohio. Elliptical in shape, the district had a length of over 100 miles with a width of over 28 miles. Within these boundaries, nature had located an abundance of all the raw materials necessary for the smelting of iron ore.

By 1875, the district contained 69 charcoal furnaces and 16 coal fired furnaces. The first smelting furnace in the district was erected in Greenup County, Kentucky, in 1818 by Richard Deering and Trimble Brothers. In 1826, the first furnace on the Ohio side of the region was built a few miles above Hanging Rock by James Rogers and Company. These furnaces, the Argillite Furnace and the Union Furnace, respectively, produced about one ton of ore per day. The excellent quality of the iron shipped from the area attracted the attention of iron manufacturers in Pittsburgh, and the success of these two operations resulted in a furnace boom that ended with the completion of the Grant Furnace on the river bank at Ironton in 1869. These furnaces brought wealth and industry to Southern Ohio until the last blast of the Jefferson Furnace in December 1916.

The iron furnace operations became the centers of industrial development in the region. Constructed in phases, the first 15 stacks were built between 1832-1834. Between 1853 and 1856, another 21 stacks were added in response to railroad improvements. In between these periods of expansion, new furnace construction averaged almost one a year. The activity of construction and industry attracted both capital and labor to the area. The substantial amount of activity drew iron masters from declining regions in Pennsylvania, Virginia, and New Jersey.

The production of ore had a tremendous impact on the area and required tremendous natural resources to meet the production of a single furnace. Typically, each furnace produced between 2,000 and 3,000 tons of iron a year. The charcoal fuel for a furnace in full production required the annual cutting of between 200 and 600 acres of timber. Considering a 20 to 30 year timber renewal, the average furnace tract ranged from 6,000 to 10,000 acres of forest.

The lumber could not directly fuel the iron ore in the furnace; consequently, charcoal making became an important process of production. To produce charcoal, men known as colliers stacked cut lumber into firing pits. The firing pit was a circular mound, approximately 40 to 50 feet in diameter, constructed on leveled ground. The average pit contained 35 to 45 cords of wood and was 10 to 12 feet high. The pit required constant attention during the 12 to 20 day slow burning process. After ignition, colliers kept the wood covered with dirt and leaves to control the amount of burning. Small amounts of charcoal were drawn off at a time and quenched with water, requiring most pits to be located near streams or creeks. The remainder of wood in the pit was resealed with dirt and a team of oxen transported the coal back to the furnace.

Additional labor excavated the ore and limestone needed for the smelting from nearby hills. The mining operation was extensive; with the tenor of the ore running between 25 and 40 percent iron the furnace required 5,000 pounds of ore for every ton of iron produced. Using only picks and shovels, miners removed ores with colorful names such as Guinea Fowl, Hallelujah, and Sour Apple. The ore ran from four to eighteen inches in thickness and could be removed up to twelve feet deep by hand. Profitable mining allowed for the removal of one foot of dirt for every one inch of ore. When an ore seam became unprofitable, the digging crews moved to another hill.

For the most part, furnaces were spaced uniformly from three to five miles apart along the outcrops of the iron ore veins. This allowed for the maximum use of the natural resources located within range of any one furnace. Due to better shipping facilities, a large concentration of furnaces were constructed within access of the Ohio River. Even so, the dominant mode of transportation of the raw ore and finished iron was by open ox cart.

The quality of iron ore for the Hanging Rock Region was unsurpassed, however, and soon established a high demand. On the recommendation of John Christopher, a professional mineralogical chemist, the English government bought large amounts of Hanging Rock iron during the Crimean War (1854-1856). Christopher performed numerous tests on American and English irons and found Hanging Rock ore superior for the production of ordnance. During the Civil War, area furnaces produced iron for the Swamp Angel, the famous cannon used during the siege of

Charleston Harbor, and the plates for the Union ironclad, *Monitor*. The demand for armaments became so great, in fact, that iron masters began to send off pigs of iron still hot. This practice, unfortunately, had the disastrous effect of setting several wooden carts on fire.

Each furnace developed its own community surrounding the output of ore. The furnace required approximately 100 men and 50 teams of oxen to operate. The laborers came from the older iron fields east of the Allegheny mountains. A large number of Irish, Scotch, English, and German immigrants also found work in the ore mines and charcoal pits. Coming with their families, the influx of labor resulted in the construction of houses, a church, a school, and a company store around each furnace operation.

There were a total of 46 charcoal furnaces in Ohio. Lawrence County had the largest number of furnaces with a total of 16. Buckhorn Furnace was built in Lawrence County in 1833 by James and Findley, who operated the furnace profitably for many years. In 1856, Seely, Willard, and Company bought the furnace. Under the management of Boudinot Seely, the furnace produced 1,450 tons of foundry iron that year.

The stone stack was erected by T. Price, a local builder who constructed several furnaces. Quarried nearby, stonemasons dressed each stone to its desired shape on site and erected the outer wall of the stack without mortar. The inner lining proved a little more difficult. Selected with care, the stone needed to be a fine grained, dense, sandstone with good refractory qualities. The stonemasons carefully dressed the circular battered wall of the furnace, each stone fitting perfectly and laid in a mortar of sand and plastic clay.

The stack was a small part of the Buckhorn Furnace. Constructed on two levels, stonemasons built the top of the stack to be even with the level above. The upper level contained two large open-sided storage sheds for keeping charcoal dry with ore and limestone piled in the open. A shed bridge connected the top of the furnace and the upper area. Furnace operators trundled the charcoal, limestone, and ore charge across this bridge to the open top of the furnace stack. On the lower level, to the left side of the stack, was a pump house used to blast air into the furnace.

The casting house was located directly in front of the stone stack. A wooden structure with a monitor roof to draw off hear, the casting house had a sand floor used to capture molten iron as it funneled out of the

central mouth of the furnace. A furnace operator scooped the sand into a ditch that had several elongated holes off to each side. The molten iron filled these troughs, which were said to resemble suckling pigs. After it cooled, the "pig iron" was broken off and transported to the Ohio River for shipping. Ox carts hauled the iron to the river until the Iron Railroad was constructed in 1851, at which time the iron was railed to Ironton for transport to barges heading for Pittsburgh or Cincinnati.

The furnace obtained iron by smelting ore in the stack. The charge of the blast was fairly simple in character. The basic method involved dumping iron ore, limestone, and fuel into the top opening of the stack, igniting it, and blasting air up through the charge to make it hotter. As the ore melted, the iron flowed into troughs dug into the sand in front of the stack. Once cooled, the chunks of iron, known as pigs, were loaded and shipped to foundries in Cincinnati or Pittsburgh. To make one ton of iron required approximately 180 bushels of charcoal, 45,000 pounds of ore, and 300 pounds of limestone.

By 1870, the furnace operations had been purchased by the Charcoal Iron Furnace Company. By this time the furnace had been converted to a hot-blast furnace that produced 12 tons daily and 2,810 tons annually. The company also owned approximately 7,500 acres from which to obtain raw material.

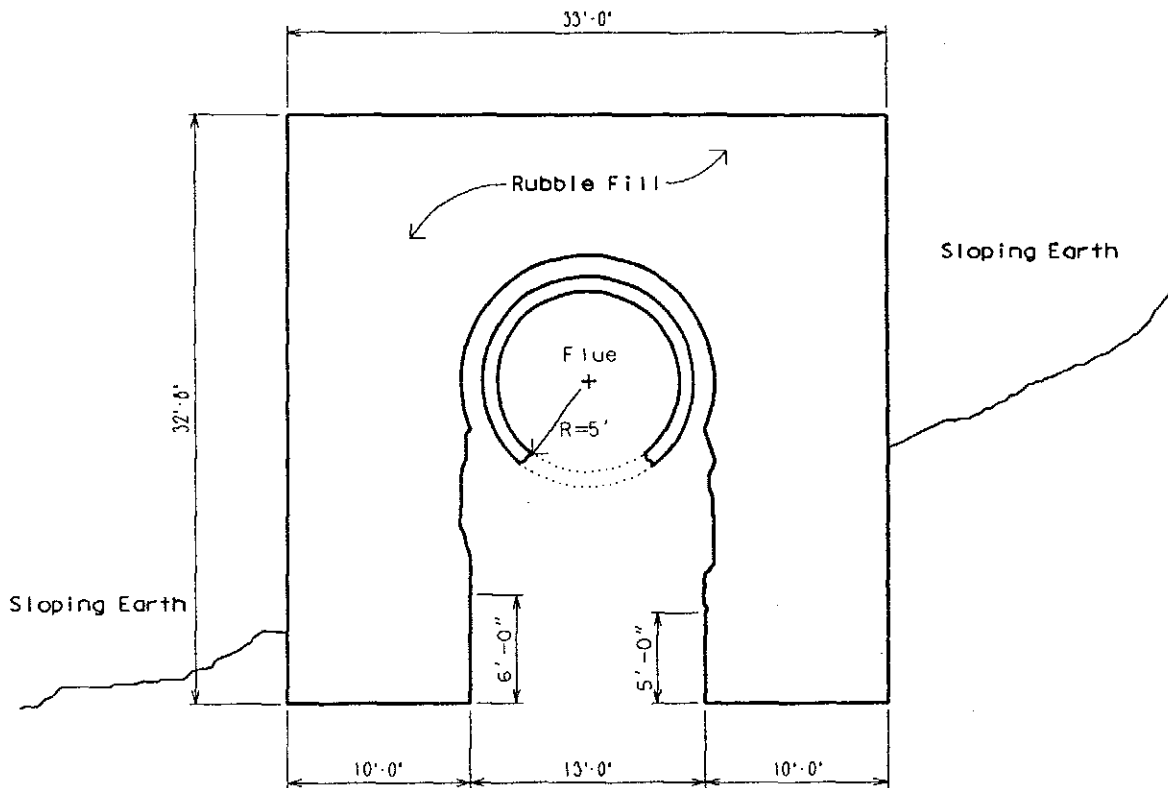
The new owners were principle movers in the iron industry of the Hanging Rock Region, with S.C. Johnson as president, John Cambell as vice president, and C.L. Nevins as secretary. The Charcoal Iron Company also owned the nearby Howard Furnace. John Cambell himself owned several other regional furnaces, including the Mount Vernon Furnace and the Helca Furnace. In 1849, he was principle stockholder of the Ohio Iron and Coal Company, and in 1850 he purchased 400 acres of land on the Ohio River and founded the town of Ironton. In 1880, Cambell continued to operate the Buckhorn Furnace under the firm of Cambell, McGugin, and Company. In 1886, McGugin became sole owner and manager, acquiring the property after the furnace had been inactive for two years. The attendant buildings soon deteriorated and by 1934 the area had been reclaimed by nature.

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Historian:

Hardlines: Design & Delineation
Columbus, Ohio
May 1997



FIRST FLOOR PLAN

Scale: $\frac{3}{32} = 1' - 0''$